IN THE CLAIMS:

Claim 1 (cancel)

Claim 2 (currently amended): An optical switch according to claim ~~1~~ 8, wherein the first optical waveguide comprises a semiconductor optical amplifier.

Claim 3 (currently amended): An optical switch according to claim ~~1~~ 8, further comprising a second multimode interferometer having at least two input ports and a first output port, the input ports being connected respectively to an output end of said first optical waveguide and an output end of said second optical waveguide.

Claim 4 (original): An optical switch according to claim 3, wherein the second multimode interferometer changes intensity of an optical signal exiting from the first output port of the second multimode interferometer, when the refractive index of the first optical waveguide is changed and phase of one of optical signals propagating through the first optical waveguide and the second optical waveguide is delayed from phase of the other optical signal.

Claim 5 (original): An optical switch according to claim 3, wherein the second multimode interferometer has a second output port other than the first output port.

Claim 6 (original): An optical switch according to claim 5, wherein the second multimode interferometer changes intensities of optical signals exiting from the first output port and the second output port of the second multimode interferometer, when the refractive index of the first optical waveguide is changed and phase of one of optical signals propagating through the first optical waveguide and the second optical waveguide is delayed from phase of the other optical signal.

Claim 7 (original): An optical switch according to claim 3, wherein the second multimode interferometer has a shape line-symmetrical to the first multimode interferometer about an imaginary straight line connecting a middle point of the first optical waveguide and a middle point of the second optical waveguide.

Claim 8 (currently amended): ~~An optical switch according to claim 1,~~ An optical switch comprising:

a first multimode interferometer having a first input port to which an optical signal is applied, and at least two output ports;

a first optical waveguide connected to one or each of plural first output ports, which is or are selected from the output ports, and allowing a light exiting from the one or plural first output ports to propagate therethrough, the first optical waveguide having a refractive index changed in response to a trigger signal externally applied;

a second optical waveguide connected to one or each of plural second output ports, which is or are selected from the output ports, and allowing a light exiting from the one or plural second output ports to propagate therethrough; and

trigger for supplying, to the first optical waveguide, the trigger signal for changing the refractive index of the first optical waveguide;

wherein the trigger comprises:

a pair of reflecting mirrors arranged in an opposed relation with the first optical waveguide interposed therebetween so that a control light is multiple-reflected between the pair of reflecting mirrors; and

control light introducer for introducing the control light into a space defined by the pair of reflecting mirrors for multiple-reflection of the control light therebetween.

Claim 9 (currently amended): ~~An optical switch according to claim 1,~~ An optical switch comprising:

a first multimode interferometer having a first input port to which an optical signal is applied, and at least two output ports;

a first optical waveguide connected to one or each of plural first output ports, which is or are selected from the output ports, and allowing a light exiting from the one or plural first output ports to propagate therethrough, the first optical waveguide having a refractive index changed in response to a trigger signal externally applied;

a second optical waveguide connected to one or each of plural second output ports, which is or are selected from the output ports, and allowing a light exiting from the one or plural second output ports to propagate therethrough; and

trigger for supplying, to the first optical waveguide, the trigger signal for changing the refractive index of the first optical waveguide;

wherein the first multimode interferometer has a second input port other than the first input port, and

wherein the trigger comprises:

a third multimode interferometer having a first input port to which a control light is applied, a first output port, and a second output port;

a third optical waveguide for introducing a light having exited from the second output port of the third multimode interferometer to the second input port of the first multimode interferometer; and

a combining optical element for combining a light having exited from the first output port of the third multimode interferometer with the optical signal, and introducing a combined light to the first input port of the first multimode interferometer.

Claim 10 (original): An optical switch according to claim 9, wherein the combining optical element includes a fourth multimode interferometer having a first input port connected to the first output port of the third multimode interferometer and having a second input port to which the optical

signal is applied, the combining optical element combining the light applied through the first input port with the optical signal applied through the second input port and then delivering a combined light from an output port thereof, the output port of the combining optical element being connected to the first input port of the first multimode interferometer.

Claim 11 (original): An optical switch according to claim 9, wherein the second optical waveguide is a non-linear waveguide having a refractive index changed depending on intensity of a light inputted to the second optical waveguide.

Claim 12 (original): An optical switch according to claim 11, wherein the third multimode interferometer has a second input port other than the first input port, wherein when a control light is applied through the first input port of the third multimode interferometer, the control light is outputted from the first output port of the first multimode interferometer, and wherein when a control light is applied through the second input port of the third multimode interferometer, the control light is outputted from the second output port of the first multimode interferometer.

Claim 13 (original): An optical switch according to claim 12, wherein the trigger further comprises a branching and delaying optical element for branching a control light applied through an input port thereof and introducing branched lights to the first input port and the second input port of the third multimode interferometer at different timings from each other.

Claim 14 (original): An optical switch according to claim 13, wherein the branching and delaying optical element comprises:

a fifth multimode interferometer having an input port to which a control light is applied, and delivering a control light applied through the input port thereof from a first output port and a second output port thereof;

a fourth optical waveguide for connecting the first output port of the fifth multimode interferometer to the first input port of the third multimode interferometer; and

a fifth optical waveguide for connecting the second output port of the fifth multimode interferometer to the second input port of the third multimode interferometer, the fifth optical waveguide having a different length from the fourth optical waveguide.

Claim 15 (withdrawn): An optical demultiplexer comprising:

a plurality of drop devices, each of the drop devices having a control light input port to which a control light is applied, an optical signal input port to which an optical signal is applied, and a drop signal output port from which the optical signal is delivered in synchronous with inputting of the control light;

a signal waveguide for branching a time-division multiplexed optical signal and introducing a plurality of branched optical signals respectively to the optical signal input ports of the drop devices; and

a control waveguide for branching one control light and introducing a plurality of branched control lights to reach the corresponding drop devices at delays gradually shifted in units of a certain time.

Claim 16 (withdrawn): An optical demultiplexer comprising:

a number N (N is two or larger integer) of drop devices, each of the drop devices having a control light input port to which a control light is applied, an optical signal input port to which an optical signal is applied, and a drop signal output port from which the optical signal is delivered in synchronous with inputting of the control light;

a signal waveguide for introducing an optical signal, which is time-division multiplexed at multiplicity of N and has a number N of channels, to the optical signal input port of each of the drop devices; and

a control waveguide for branching one control light into a number N of control lights and introducing an i-th (i is an integer not smaller than 1 but not larger than N) one of the branched control lights to the control light input port of an i-th drop device,

the signal waveguide and the control waveguide delaying one of the control light and the optical signal relative to the other such that the control light applied to the i-th drop device is in synchronous with an i-th channel of the optical signal applied to the i-th drop device.

Claim 17 (withdrawn): An optical demultiplexer comprising:

a number N (N is two or larger integer) of drop devices arranged from a first stage to an N-th stage, each of the drop devices having a control light input port to which a control light is applied, an optical signal input port to which an optical signal is applied, a drop signal output port from which the optical signal is delivered in synchronous with inputting of the control light, and a through signal output port from which the optical signal is delivered at least during a period in which the optical signal is not delivered from the drop signal output port;

a first signal waveguide for introducing a time-division multiplexed optical signal to the optical signal input port of the first-stage drop device;

a second signal waveguide for connecting the through signal output port of each drop device to the optical signal input port of the drop device in a next stage; and

a control waveguide for branching one control light and introducing a plurality of branched control lights to reach the corresponding drop devices at delays gradually shifted in units of a certain time toward a most downstream stage.

Claim 18 (withdrawn): An optical demultiplexer according to claim 17, wherein the optical signal is a signal having a number N of time-division multiplexed channels, and

wherein the control waveguide delays the control light inputted to an i-th (i is an integer not smaller than 1 but not larger than N) drop device to be in synchronous with an i-th channel of the optical signal inputted to the i-th drop device.

Claim 19 (withdrawn): An optical demultiplexer according to claim 15, wherein each of the drop devices is constituted by an optical switch, the optical switch comprising:

a first multimode interferometer having a first input port to which an optical signal is applied, and at least two output ports;

a first optical waveguide connected to one or each of plural first output ports, which is or are selected from the output ports, and allowing a light exiting from the one or plural first output ports to propagate therethrough, the first optical waveguide having a refractive index changed in response to a trigger signal externally applied;

a second optical waveguide connected to one or each of plural second output ports, which is or are selected from the output ports, and allowing a light exiting from the one or plural second output ports to propagate therethrough; and

trigger for supplying, to the first optical waveguide, the trigger signal for changing the refractive index of the first optical waveguide, and

wherein the first multimode interferometer has a second input port other than the first input port, and

wherein the trigger comprises:

a third multimode interferometer having a first input port to which a control light is applied, a first output port, and a second output port;

a third optical waveguide for introducing a light having exited from the second output port of the third multimode interferometer to the second input port of the first multimode interferometer; and

a combining optical element for combining a light having exited from the first output port of the third multimode interferometer with the optical signal, and introducing a combined light to the first input port of the first multimode interferometer.

Claim 20 (withdrawn): An optical demultiplexer according to claim 16, wherein each of the drop devices is constituted by an optical switch, the optical switch comprising:

a first multimode interferometer having a first input port to which an optical signal is applied, and at least two output ports;

a first optical waveguide connected to one or each of plural first output ports, which is or are selected from the output ports, and allowing a light exiting from the one or plural first output ports to propagate therethrough, the first optical waveguide having a refractive index changed in response to a trigger signal externally applied;

a second optical waveguide connected to one or each of plural second output ports, which is or are selected from the output ports, and allowing a light exiting from the one or plural second output ports to propagate therethrough; and

trigger for supplying, to the first optical waveguide, the trigger signal for changing the refractive index of the first optical waveguide, and

wherein the first multimode interferometer has a second input port other than the first input port, and

wherein the trigger comprises:

a third multimode interferometer having a first input port to which a control light is applied, a first output port, and a second output port;

a third optical waveguide for introducing a light having exited from the second output port of the third multimode interferometer to the second input port of the first multimode interferometer; and

a combining optical element for combining a light having exited from the first output port of the third multimode interferometer with the optical signal, and introducing a combined light to the first input port of the first multimode interferometer.

Claim 21 (withdrawn): An optical demultiplexer according to claim 17, wherein each of the drop devices is constituted by an optical switch, the optical switch comprising:

a first multimode interferometer having a first input port to which an optical signal is applied, and at least two output ports;

a first optical waveguide connected to one or each of plural first output ports, which is or are selected from the output ports, and allowing a light exiting from the one or plural first output ports to propagate therethrough, the first optical waveguide having a refractive index changed in response to a trigger signal externally applied;

a second optical waveguide connected to one or each of plural second output ports, which is or are selected from the output ports, and allowing a light exiting from the one or plural second output ports to propagate therethrough; and

trigger for supplying, to the first optical waveguide, the trigger signal for changing the refractive index of the first optical waveguide, and

wherein the first multimode interferometer has a second input port other than the first input port, and

wherein the trigger comprises:

a third multimode interferometer having a first input port to which a control light is applied, a first output port, and a second output port;

a third optical waveguide for introducing a light having exited from the second output port of the third multimode interferometer to the second input port of the first multimode interferometer; and

a combining optical element for combining a light having exited from the first output port of the third multimode interferometer with the optical signal, and introducing a combined light to the first input port of the first multimode interferometer.

Claim 22 (withdrawn): An optical demultiplexer according to claim 15, further comprising a transducer for converting the optical signal delivered from the drop signal output port of each of said drop devices into an electrical signal.

Claim 23 (withdrawn): An optical demultiplexer according to claim 16, further comprising a transducer for converting the optical signal delivered from the drop signal output port of each of said drop devices into an electrical signal.

Claim 24 (withdrawn): An optical demultiplexer according to Claim 17, further comprising a transducer for converting the optical signal delivered from the drop signal output port of each of said drop devices into an electrical signal.

Claim 25 (new): An optical switch comprising:

a first multimode interferometer having a first input port to which an optical signal is applied, and at least two output ports;

a first optical waveguide connected to one or each of plural first output ports, which is or are selected from the output ports, and allowing a light exiting from the one or plural first output ports to propagate therethrough, the first optical waveguide having a refractive index changed in response to a trigger signal externally applied;

a second optical waveguide connected to one or each of plural second output ports, which is or are selected from the output ports, and allowing a light exiting from the one or plural second output ports to propagate therethrough; and

trigger for supplying, to the first optical waveguide, the trigger signal for changing the refractive index of the first optical waveguide;

wherein the trigger comprises a pair of reflecting mirrors arranged in an opposed relation with the first optical waveguide interposed therebetween so that a control light is multiple-reflected between the pair of reflecting mirrors.

Claim 26 (new): An optical switch according to claim 25, wherein the first optical waveguide comprises a semiconductor optical amplifier.

Claim 27 (new): An optical switch according to claim 25, further comprising a second multimode interferometer having at least two input ports and a first output port, the input ports being connected respectively to an output end of said first optical waveguide and an output end of said second optical waveguide.

Claim 28 (new): An optical switch according to claim 27, wherein the second multimode interferometer changes intensity of an optical signal exiting from the first output port of the second multimode interferometer, when the refractive index of the first optical waveguide is changed and phase of one of optical signals propagating through the first optical waveguide and the second optical waveguide is delayed from phase of the other optical signal.

Claim 29 (new): An optical switch according to claim 27, wherein the second multimode interferometer has a second output port other than the first output port.

Claim 30 (new): An optical switch according to claim 29, wherein the second multimode interferometer changes intensities of optical signals exiting from the first output port and the second output port of the second multimode interferometer, when the refractive index of the first optical waveguide is changed and phase of one of optical signals propagating through the first optical waveguide and the second optical waveguide is delayed from phase of the other optical signal.

Claim 31 (new): An optical switch according to claim 31, wherein the second multimode interferometer has a shape line-symmetrical to the first multimode interferometer about an imaginary straight line connecting a middle point of the first optical waveguide and a middle point of the second optical waveguide.